PATENT ABSTRACTS OF JAPAN

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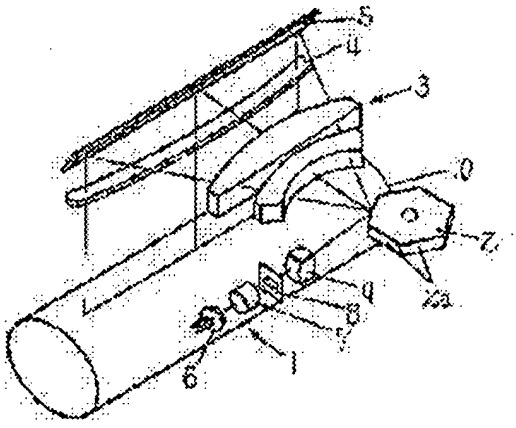
(54) OPTICAL SCANNER

(57)Abstract:

PROBLEM TO BE SOLVED: To improve the quality of an image formed by optical scanning by correcting the bending and inclination of scanning line on the surface to be scanned.

SOLUTION: This optical scanner is provided with a laser light source 1, a deflector 2 for deflecting a light flux emitted from this laser light source 1 in the direction of main scanning, an optical scanning system 3 for making the light flux deflected by this deflector 2 scan the surface 10 to be scanned at a constant speed while converging the light flux, and an optical correcting system 4 arranged between the surface 10 and the optical scanning system 3 for converging the light flux on the scanned surface in a way of geometrical optics. In the scanner, a 1st reflecting mirror 5 is arranged between the optical scanning system 3 and the optical correcting system 4, and it 5 is supported to be freely turned around the center of turning and to be freely fixed at an arbitrary position.



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CLAIMS

[Claim(s)]
[Claim 1] A laser light source and the deflecting system which makes a main scanning direction deflect the flux of light by which outgoing radiation was carried out from this laser light source, The scan optical system which makes a scan-layer-ed top scan at uniform velocity, completing the flux of light deflected by this deflecting system, In light-scanning equipment equipped with the amendment optical system which it is installed [optical system] between said scan layers-ed and said scan optical system, and completes the flux of light in geometrical optics on a scan layer-ed Light-scanning equipment characterized by having arranged the first reflective mirror between said scan optical system and the aforementioned amendment optical system, and supporting this first reflective mirror free [rotation] and free [arbitration location immobilization] to the surroundings based on [along a main scanning direction] rotation.
[Claim 2] Light-scanning equipment according to claim 1 characterized by having arranged the second reflective mirror between amendment optical system and a scan layer-ed, and supporting this second reflective mirror free [rotation] and free [arbitration location immobilization] to the surroundings based on [along a main scanning direction] rotation.
[Claim 3] A laser light source and the deflecting system which makes a main scanning direction deflect the flux of light by which outgoing radiation was carried out from this laser light source, The scan optical system which makes a scan-layer-ed top scan at uniform velocity, completing the flux of light deflected by this deflecting system, Light-scanning equipment characterized by supporting said amendment optical system free [rotation] and free [arbitration location immobilization] to the surroundings based on [parallel to the direction of an optical axis] rotation in light-scanning equipment equipped with the amendment optical system which it is installed [optical system] between said scan layers-ed and said scan optical system, and completes the flux of light in geometrical optics on a scan layer-ed.
[Claim 4] Light-scanning equipment according to claim 3 characterized by having formed the supporter which has a back face parallel to the rotation direction of this amendment optical system in the both ends of the main scanning direction of amendment optical system, and establishing the datum plane which is perpendicular to the direction of an optical axis, carries out field contact with said back face, and supports said supporter free [sliding] in the housing section.
[Claim 5] Light-scanning equipment according to claim 3 characterized by having established a positioning means to position the main scanning direction of this amendment optical system to amendment optical system, and preparing the engagement section which engages with said positioning means in the housing section.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the light-scanning equipment used with a laser beam printer, a digital copier, etc.
[0002]
[Description of the Prior Art] Conventionally, the flux of light by which outgoing radiation was carried out is deflected from a laser light source with deflecting system, and there is a thing of various structures as light-scanning equipment which makes a scan layer-ed scan. There is light-scanning equipment indicated by JP,9-133888,A as the example. The laser light source which consists of a collimator lens which changes the emission light of semiconductor laser and this semiconductor laser into parallel light, It is constituted by the scan optical system which makes a scan-layer-ed top scan at uniform velocity, the amendment optical system which is established between scan optical system and a scan layer-ed, and amends the effect of the failure by the field of deflecting system, completing the deflecting system which makes a main scanning direction deflect the flux of light by which outgoing radiation was carried out from a laser light source, and the deflected flux of light.
[0003]
[Problem(s) to be Solved by the Invention] However, the scanning-line deflection of an image formation location not becoming a straight-line top, but curving with the eccentricity at the time of installing amendment optical system if the flux of light which passes amendment optical system carries out eccentricity from the center line location along the main scanning direction of this amendment optical system occurs.
[0004] Moreover, with the light-scanning equipment of the above-mentioned structure, if the flux of light which passes amendment optical system inclines according to amendment optical system or the arrangement error of other optical elements to the center line along the main scanning direction of this amendment optical system, the scanning-line inclination that the scanning line on a scan layer-ed inclines will occur.
[0005] And if the scanning-line deflection and the scanning-line inclination which were mentioned above occur, when arranging two or more light-scanning equipments and forming a color picture, it will become the cause of color gap.
[0006] Then, this invention aims at offering the light-scanning equipment which can amend scanning-line deflection and a scanning-line inclination.
[0007]
[Means for Solving the Problem] The deflecting system with which invention according to claim 1 makes a main scanning direction deflect the flux of light by which outgoing radiation was carried out from a laser light source and this laser light source, The scan optical system which makes a scan-layer-ed top scan at uniform velocity, completing the flux of light deflected by this deflecting system, In light-scanning equipment equipped with the amendment optical system which it is installed [optical system] between said scan layers-ed and said scan optical system, and completes the flux of light in geometrical

optics on a scan layer-ed The first reflective mirror has been arranged between said amendment optical system as said scan optical system, and this first reflective mirror was supported free [rotation] and free [arbitration location immobilization] to the surroundings based on [along a main scanning direction] rotation. Therefore, when the flux of light which passes amendment optical system carries out eccentricity from the center line location along the main scanning direction of this amendment optical system and scanning-line deflection occurs with the eccentricity at the time of installing amendment optical system, the first reflective mirror is rotated to the surroundings based on rotation, and it adjusts so that it may pass through the center line location where the flux of light met the main scanning direction of amendment optical system, and this amends scanning-line deflection.

[0008] that the rotation to the surroundings based on [which has arranged the second reflective mirror between amendment optical system and a scan layer-ed and met the main scanning direction in this second reflective mirror in the light-scanning equipment of invention according to claim 1] rotation is free for invention according to claim 2, and arbitration location immobilization -- free -- having supported . Therefore, when the first reflective mirror is rotated, scanning-line deflection is amended and the location of the scanning line on a scan layer-ed shifts in the direction of vertical scanning, the gap is amended by rotating the second reflective mirror to the surroundings based on rotation.

[0009] The deflecting system with which invention according to claim 3 makes a main scanning direction deflect the flux of light by which outgoing radiation was carried out from a laser light source and this laser light source, The scan optical system which makes a scan-layer-ed top scan at uniform velocity, completing the flux of light deflected by this deflecting system, In light-scanning equipment equipped with the amendment optical system which it is installed [optical system] between said scan layers-ed and said scan optical system, and completes the flux of light in geometrical optics on a scan layer-ed, said amendment optical system was supported free [rotation] and free [arbitration location immobilization] to the surroundings based on [parallel to the direction of an optical axis] rotation. Therefore, when the flux of light which passes amendment optical system inclines according to amendment optical system or the arrangement error of other optical elements to the center line along the main scanning direction of this amendment optical system and a scanning-line inclination occurs, amendment optical system is rotated to the surroundings based on rotation, and it adjusts so that it may pass through the location where the flux of light met the main scanning direction of amendment optical system, and this amends a scanning-line inclination.

[0010] In the light-scanning equipment of invention according to claim 3, invention according to claim 4 formed the supporter which has a back face parallel to the rotation direction of this amendment optical system in the both ends of the main scanning direction of amendment optical system, and established the datum plane which is perpendicular to the direction of an optical axis, carries out field contact with said back face, and supports said supporter free [sliding] in the housing section. Therefore, when amendment optical system is rotated and a scanning-line inclination is amended, it is prevented that amendment optical system moves in the direction of an optical axis.

[0011] In the light-scanning equipment of invention according to claim 3, invention according to claim 5 established a positioning means to position the main scanning direction of this amendment optical system to amendment optical system, and prepared the engagement section which engages with said positioning means in the housing section. Therefore, when amendment optical system is rotated and a scanning-line inclination is amended, it is prevented that amendment optical system moves to a main scanning direction.

[0012]

[Embodiment of the Invention] The gestalt of operation of the first of this invention is explained based on drawing 1 thru/or drawing 13 . Drawing 1 is the perspective view showing the outline structure of light-scanning equipment. This light-scanning equipment is equipped with a laser light source 1, the scan optical system 3 which consists of a lens of two or more [2 or] polygon mirrors which are deflecting system, the amendment optical system 4, and the first reflective mirror 5.

[0013] Said laser light source 1 consists of semiconductor laser 6 and a collimator lens 7, and when the laser beam which is the divergence flux of light by which outgoing radiation was carried out from

semiconductor laser 6 passes a collimator lens 7, it serves as the parallel flux of light. Furthermore, incidence of the laser beam which passed the collimator lens 7 is carried out to the cylinder lens 9 through aperture 8. Said polygon mirror 2 by which this cylinder lens 9 makes a main scanning direction carry out image formation of the parallel flux of light from said laser light source 1 as a long line image, and a rotation drive is carried out by having two or more deviation reflector 2a near the image formation location of this cylinder lens 9 is arranged. The flux of light by which incidence was carried out is deflected by the main scanning direction with high-speed rotation of the polygon mirror 2 to the polygon mirror 2. Between this polygon mirror 2 and the photo conductor 10 which is a scan layer-ed, said scan optical system 3, first reflective mirror 5, and amendment optical system 4 are arranged.

[0014] Said scan optical system 3 consists of two or more lenses, and a photo conductor 10 top is made to scan in uniform velocity, completing the flux of light deflected by the polygon mirror 2. Said amendment optical system 4 amends the curvature of field of the direction of vertical scanning of the image by which image formation is carried out on a photo conductor 10. moreover -- amendment -- optical system -- four -- this -- amendment -- optical system -- four -- passing -- the flux of light -- a travelling direction (the direction of an optical axis) -- being parallel -- rotation -- a core -- the surroundings -- rotation -- free -- and -- arbitration -- a location -- immobilization -- free -- supporting -- having -- rotation -- a core -- the surroundings -- rotating -- things -- a scanning-line inclination -- amending . said -- the -- one -- reflection -- a mirror -- five -- said -- a scan -- optical system -- three -- said -- amendment -- optical system -- four -- between -- arranging -- having -- a polygon -- a mirror -- two -- deviating -- having had -- the flux of light -- a main scanning direction -- having met -- rotation -- a core -- the surroundings -- rotation -- free -- and -- arbitration -- a location -- immobilization -- free -- supporting -- having -- rotation -- a core -- the surroundings -- rotating -- things -- scanning-line deflection -- amending .

[0015] Here, the principle which carries out rotation actuation of the first reflective mirror 5 at the surroundings based on rotation, and amends scanning-line deflection is explained based on drawing 2 thru/or drawing 4 . In addition, ****** to which the flux of light progresses system of coordinates is appointed as X, a main scanning direction is appointed at Z, it swerves from Y and the direction of vertical scanning, and the rotation direction of ** is set to gamma, beta, and alpha.

[0016] In drawing 2 , if the first reflective mirror 5 is rotated in the direction of beta, the scanning line on a photo conductor 10 will move in the direction of vertical scanning (Z direction) like A, B, and C. The scanning line B is the scanning line at the time of passing through the center line location where the flux of light which passes the amendment optical system 4 met the main scanning direction of this amendment optical system 4. The scanning lines A and C are the scanning lines when the flux of light which passes the amendment optical system 4 carries out eccentricity from the center line location along the main scanning direction of this amendment optical system 4.

[0017] When the flux of light which passes the amendment optical system 4 carries out eccentricity from the center line location along the main scanning direction of this amendment optical system 4, it curves, as the property of the amendment optical system 4 shows the scanning line on a photo conductor 10 to drawing 4 . If gap with the straight line which connected the both ends in the main scanning direction of the scanning line, and the core of a main scanning direction is defined as an amount of scanning-line deflection, as for the amount dw of scanning-line deflection of the scanning line C, and amount dwof scanning-line deflection ' of the scanning line A, a direction will serve as an amount of the reverse sense. Moreover, the amount of scanning-line deflection becomes large as it separates from the scanning line B. That is, scanning-line deflection can change the straight direction and magnitude free by rotating the first reflective mirror 5 in the direction of beta.

[0018] The principle which carries out rotation actuation of the amendment optical system 4 at the surroundings based on rotation, and amends a scanning-line inclination next is explained based on drawing 5 and drawing 6 R> 6.

[0019] In drawing 5 , if the other end side Q is rotated in the direction of gamma by using the end side P along the main scanning direction of the amendment optical system 4 as the supporting point, the scanning line on a photo conductor 10 will be rotated in the direction of I, RO, and Ha in the direction of

gamma with the property of the amendment optical system 4. Scanning-line RO is the scanning line at the time of passing through the center line location where the flux of light which passes the amendment optical system 4 met the main scanning direction of this amendment optical system 4. Scanning-line I and Ha are the scanning lines when the flux of light which passes the amendment optical system 4 inclines to the center line along the main scanning direction of this amendment optical system 4.
[0020] Drawing 6 shows the inclination condition of the scanning line when the flux of light which passes the amendment optical system 4 inclines to the center line along the main scanning direction of this amendment optical system 4. Scanning-line I and Ha have the opposite direction of an inclination. Moreover, the inclination dk of the scanning line becomes large as it separates from scanning-line RO. That is, the inclination of the scanning line can change the direction and magnitude of the inclination free by rotating the amendment optical system 4 in the direction of gamma.
[0021] The structure which supports the first reflective mirror 5 free [rotation] and free [arbitration location immobilization] to the surroundings based on [along a main scanning direction] rotation next is explained based on drawing 7 and drawing 8 . Drawing 7 R> 7 is the decomposition perspective view showing the attachment structure of the first reflective mirror 5. The attachment sections 12 and 13 of the pair which supports the both ends of the main scanning direction of the first reflective mirror 5 are being fixed to the housing section 11 (refer to drawing 11) in which the light-scanning equipment containing the first reflective mirror 5 is installed. Projection 12a, screw hole 12b, and screw hole 12c of a triangle pole form are formed in one attachment section 12. The attachment screw 15 which attaches a flat spring 14 is screwed in screw hole 12b. The adjusting screw 16 which carries out rotation accommodation of the first reflective mirror 5 is screwed in screw hole 12c. This adjusting screw 16 can be freely rotated in the direction of arrow-head R, and this adjusting screw 16 moves in the direction of arrow-head S by carrying out rotation actuation of the adjusting screw 16 in the direction of arrow-head R. Projection 13a and screw hole 13b of a triangle pole form are formed in the attachment section 13 of another side. The attachment screw 18 which attaches a flat spring 17 is screwed in screw hole 13b.
[0022] Drawing 8 is in the condition which supported the first reflective mirror 5 free [rotation] and free [arbitration location immobilization] to the surroundings based on [along a main scanning direction] rotation. Three points of the point of Projections 12a and 13a and the point of an adjusting screw 16 are contacted by the reflector of the first reflective mirror 5. And the reflector of the first reflective mirror 5 is forced on three points of the point of Projections 12a and 13a, and the point of an adjusting screw 16 by the energization force of flat springs 14 and 17.
[0023] Below, the detailed structure of the amendment optical system 4 is shown in drawing 9 , and the structure which supports this amendment optical system 4 free [rotation] and free [arbitration location immobilization] to the surroundings based on [parallel to the direction of an optical axis] rotation is explained based on drawing 10 thru/or drawing 13 .
[0024] As shown in drawing 9 , the amendment optical system 4 has structure which really fabricated with resin rib section 4b allotted so that lens section 4a and this lens section 4a may be surrounded. The supporters 4e and 4f with the back faces 4c and 4d parallel to the rotation direction which rotates this amendment optical system 4 to the surroundings based on rotation are formed in the both ends of the main scanning direction of the amendment optical system 4. Furthermore, 4g of locatings lug which are a positioning means to position the main scanning direction of this amendment optical system 4 is projected and formed in the center section along the main scanning direction in rib section 4b of the amendment optical system 4 in the direction of an optical axis. The cross section of the sense which intersects perpendicularly with the direction of an optical axis of locating-lug 4a is formed in circular or the configuration where the rectangular angle was rounded off.
[0025] Drawing 10 is the decomposition perspective view showing the attachment structure of the amendment optical system 4. The attachment sections 19 and 20 of the pair which supports the both ends of the main scanning direction of the amendment optical system 4 are being fixed to said housing section 11 in which light-scanning equipment including the amendment optical system 4 is installed. The datum level 19a and 20a which is perpendicular to the direction of an optical axis, carries out field contact with said back faces 4c and 4d, and supports said supporters 4e and 4f free [sliding] is formed

in these attachment sections 19 and 20.
[0026] Fixed parts 21 and 22 are being fixed to the location which approached said attachment sections 19 and 20 at said housing section 11. The semicircle cylinder part 23 which extended in the direction of an optical axis is formed in one fixed part 21. The adjusting screw 24 which carries out rotation accommodation of the amendment optical system 4 is attached in the fixed part 22 of another side. This adjusting screw 24 can be freely rotated in the direction of arrow-head J, and this adjusting screw 24 moves in the direction of arrow-head K by carrying out rotation actuation of the adjusting screw 24 in the direction of arrow-head J.
[0027] Moreover, in the location close to said attachment sections 19 and 20, the flat spring 26 of a pair is attached in said housing section 11 with the attachment screw 25. These flat springs 26 have the spring sections 26a and 26b of a merits-and-demerits pair.
[0028] Furthermore, the engagement slot 27 which is the engagement section with which 4g of said locatings lug engages is formed in said housing section 11.
[0029] It is the front view in which the side elevation in the condition that drawing 11 supported the amendment optical system 4 free [the rotation to the surroundings based on / parallel to the direction of an optical axis / rotation] and free [arbitration location immobilization], and drawing 12 show the top view, and drawing 13 shows the part. Field contact of the back faces 4c and 4d of the amendment optical system 4 and the datum level 19a and 20a of the attachment sections 19 and 20 is carried out. The semicircle cylinder part 23 is contacted by the side face of rib section 4b by the side of the end of the amendment optical system 4, and the point of an adjusting screw 24 is contacted by the side face of rib section 4b by the side of the other end. Moreover, it is contacted by the top-face section whose spring section 26a of the long picture of a flat spring 26 is Supporters 4e and 4f, and short length spring section 26b of a flat spring 26 is contacted by the side face of rib section 4b. Furthermore, 4g of locatings lug is engaging with the engagement slot 27.
[0030] In such a configuration, as shown in drawing 8 , after supporting the first reflective mirror 5, rotation actuation of the stretching screw 16 is carried out in the direction of arrow-head R. Then, a stretching screw 16 moves in the direction of arrow-head S, and the first reflective mirror 5 rotates in the direction of arrow-head beta. And when the first reflective mirror 5 rotates in the direction of arrow-head beta, as drawing 2 thru/or drawing 4 explained, the center line location which met the main scanning direction of this amendment optical system 4 in the flux of light which passes the scan optical system 3 can be passed. Therefore, even if the flux of light which passes the amendment optical system 4 carries out eccentricity with the eccentricity at the time of installing the amendment optical system 4 from the center line location along the main scanning direction of this amendment optical system 4 By carrying out rotation actuation of the first reflective mirror 5, the center line location which met the main scanning direction of the amendment optical system 4 in the flux of light which passes this amendment optical system 4 can be passed, and, thereby, generating of the scanning-line deflection on a photo conductor 10 can be prevented.
[0031] For this reason, when arranging two or more light-scanning equipments and forming a color picture, generating of the color gap from which scanning-line deflection becomes a cause can be prevented.
[0032] Next, as shown in drawing 11 and drawing 12 , after supporting the amendment optical system 4, a stretching screw 24 is rotated in the direction of arrow-head J. Then, a stretching screw 24 moves in the direction of arrow-head K, and the end side of the amendment optical system 4 rotates in the direction of arrow-head gamma. And when the amendment optical system 4 rotates in the direction of arrow-head gamma, as drawing 5 and drawing 6 explained, the flux of light which passes the amendment optical system 4 can be passed along with the center line along the main scanning direction of this amendment optical system 4. Therefore, even if the flux of light which passes the amendment optical system 4 inclines to the center line along the main scanning direction of this amendment optical system 4 according to the amendment optical system 4 or the arrangement error of other optical elements By carrying out rotation actuation of the amendment optical system 4, the flux of light which passes this amendment optical system 4 can be passed along with the center line along the main

scanning direction of the amendment optical system 4, and, thereby, the scanning-line inclination on a photo conductor 10 can be amended.

[0033] For this reason, when arranging two or more light-scanning equipments and forming a color picture, generating of the color gap from which a scanning-line inclination becomes a cause can be prevented.

[0034] Moreover, when rotating the amendment optical system 4 in the direction of arrow-head gamma, in order that back faces 4c and 4d and datum level 19a and 20a may carry out field contact and may slide, it is prevented that the amendment optical system 4 moves in the direction of an optical axis with this rotation. For this reason, even when the amendment optical system 4 is rotated and a scanning-line inclination is amended, the diameter of a spot of the flux of light on a photo conductor 10 becomes fixed, and image quality is stabilized.

[0035] Furthermore, since 4g of locatings lug is engaging with the engagement slot 27 when rotating the amendment optical system 4 in the direction of arrow-head gamma, it is prevented that the amendment optical system 4 moves to a main scanning direction with this rotation. For this reason, even when the amendment optical system 4 is rotated and a scanning-line inclination is amended, generating of the location gap along the main scanning direction of the scanning line is prevented, and image quality is stabilized.

[0036] Below, the gestalt of operation of the second of this invention is explained based on drawing 14 R> 4. In addition, the same sign shows the same part as the part explained in drawing 1 thru/or drawing 13 , and it also omits explanation. that the rotation to the surroundings based on [which has arranged the second reflective mirror 28 between the amendment optical system 4 and a photo conductor 10, and met the main scanning direction in this second reflective mirror 28 to the light-scanning equipment of the gestalt of the first operation] rotation is free for the light-scanning equipment of the gestalt of this operation, and arbitration location immobilization -- free -- supporting . As this supporting structure, it is the same as the structure shown in drawing 7 and drawing 8 .

[0037] In such a configuration, when the first reflective mirror 5 is rotated and scanning-line deflection is amended, the location of the scanning line on a photo conductor 10 may shift in the direction of vertical scanning. In such a case, the gap can be amended by carrying out rotation actuation of the second reflective mirror 28.

[0038] For this reason, when arranging two or more light-scanning equipments and forming a color picture, it can prevent carrying out color gap in the direction of vertical scanning about each color.

[0039]

[Effect of the Invention] Since according to the light-scanning equipment of invention according to claim 1 the first reflective mirror is arranged between scan optical system and amendment optical system and this first reflective mirror was supported free [rotation] and free [arbitration location immobilization] to the surroundings based on [along a main scanning direction] rotation When the flux of light which passes amendment optical system carries out eccentricity from the center line location along the main scanning direction of this amendment optical system and scanning-line deflection occurs with the eccentricity at the time of installing amendment optical system By rotating the first reflective mirror to the surroundings based on [along a main scanning direction] rotation It can adjust so that it may pass through the center line location where the flux of light which passes amendment optical system met the main scanning direction of amendment optical system, and thereby, scanning-line deflection can be amended and the quality of the image formed by light scanning can be raised.

[0040] According to the light-scanning equipment of invention according to claim 2, it sets to the light-scanning equipment of invention according to claim 1. Since the second reflective mirror is arranged between amendment optical system and a scan layer-ed and this second reflective mirror was supported free [rotation] and free [arbitration location immobilization] to the surroundings based on [along a main scanning direction] rotation When the first reflective mirror is rotated, scanning-line deflection is amended and the location of the scanning line on a scan layer-ed shifts in the direction of vertical scanning When the gap can be amended, the quality of the image which this forms by light scanning can be raised and it forms a color picture especially by rotating the second reflective mirror to the

surroundings based on rotation, it can prevent that each color carries out color gap in the direction of vertical scanning.

[0041] Since amendment optical system was supported free [rotation] and free [arbitration location immobilization] to the surroundings based on [parallel to the direction of an optical axis] rotation according to the light-scanning equipment of invention according to claim 3 When the flux of light which passes amendment optical system inclines according to amendment optical system or the arrangement error of other optical elements to the center line along the main scanning direction of this amendment optical system and a scanning-line inclination occurs It can adjust so that it may pass through the location where the flux of light which passes amendment optical system by rotating amendment optical system to the surroundings based on rotation met the main scanning direction of amendment optical system. By this A scanning-line inclination can be amended and the quality of the image formed by light scanning can be raised.

[0042] According to the light-scanning equipment of invention according to claim 4, it sets to the light-scanning equipment of invention according to claim 3. Since the supporter which has a back face parallel to the rotation direction of this amendment optical system in the both ends of the main scanning direction of amendment optical system was formed and the datum plane which is perpendicular to the direction of an optical axis, carries out field contact with said back face, and supports said supporter free [sliding] was established in the housing section When amendment optical system is rotated and a scanning-line inclination is amended, it can prevent that amendment optical system moves in the direction of an optical axis, and the quality of the image which fixes the diameter of a spot of the flux of light on a scan layer-ed, and is formed by this light scanning can be raised.

[0043] According to the light-scanning equipment of invention according to claim 5, it sets to the light-scanning equipment of invention according to claim 3. Since a positioning means to position the main scanning direction of this amendment optical system to amendment optical system was established and the engagement section which engages with said positioning means was prepared in the housing section When amendment optical system is rotated and a scanning-line inclination is amended, it can prevent that amendment optical system moves to a main scanning direction, and the quality of the image which prevents generating of the location gap along the main scanning direction of the scanning line, and is formed by this light scanning can be raised.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view showing the outline structure of the light-scanning equipment in the gestalt of operation of the first of this invention.
[Drawing 2] It is a perspective view explaining the principle which amends scanning-line deflection.
[Drawing 3] It is a side elevation explaining the principle which amends scanning-line deflection.
[Drawing 4] It is a top view explaining the principle which amends scanning-line deflection.
[Drawing 5] It is a perspective view explaining the principle which amends a scanning-line inclination.
[Drawing 6] It is a top view explaining the principle which amends a scanning-line inclination.
[Drawing 7] It is the decomposition perspective view showing the attachment structure of the first reflective mirror.
[Drawing 8] It is the perspective view showing the attachment condition of the first reflective mirror.
[Drawing 9] It is the perspective view showing the structure of amendment optical system.
[Drawing 10] It is the decomposition perspective view showing the attachment structure of amendment optical system.
[Drawing 11] It is the side elevation showing the attachment condition of amendment optical system.
[Drawing 12] It is the top view showing the attachment condition of amendment optical system.
[Drawing 13] It is the front view showing the engagement condition of the locating lug and engagement slot at the time of attachment of amendment optical system.
[Drawing 14] It is the mimetic diagram showing the outline structure of the light-scanning equipment in the gestalt of operation of the second of this invention.
[Description of Notations]
1 Laser Light Source
2 Deflecting System
3 Scan Optical System
4 Amendment Optical System
4c, 4d Back face
4e, 4f Supporter
4g Positioning means
5 First Reflective Mirror
10 Scan Layer-ed
11 Housing Section
19a, 20a Datum level
27 Engagement Section
28 Second Reflective Mirror

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[Drawing 4] It is a top view explaining the principle which amends scanning-line deflection.
[Drawing 5] It is a perspective view explaining the principle which amends a scanning-line inclination.
[Drawing 6] It is a top view explaining the principle which amends a scanning-line inclination.
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[Drawing 11] It is the side elevation showing the attachment condition of amendment optical system.
[Drawing 12] It is the top view showing the attachment condition of amendment optical system.
[Drawing 13] It is the front view showing the engagement condition of the locating lug and engagement slot at the time of attachment of amendment optical system.
[Drawing 14] It is the mimetic diagram showing the outline structure of the light-scanning equipment in the gestalt of operation of the second of this invention.
[Description of Notations]
1 Laser Light Source
2 Deflecting System
3 Scan Optical System
4 Amendment Optical System
4c, 4d Back face
4e, 4f Supporter
4g Positioning means
5 First Reflective Mirror
10 Scan Layer-ed
11 Housing Section
19a, 20a Datum level
27 Engagement Section
28 Second Reflective Mirror

[Translation done.]

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審査請求　未請求　請求項の数５　ＯＬ　（全８頁）

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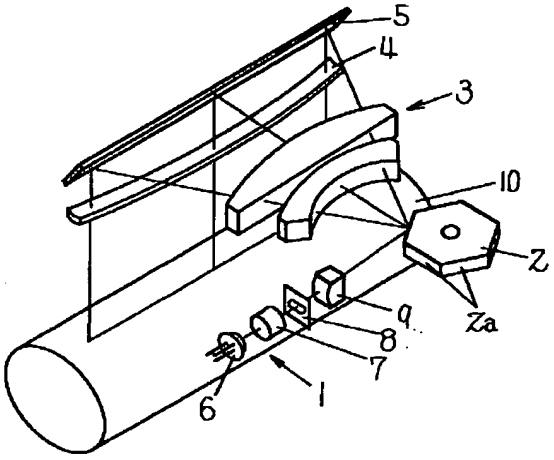
(54)【発明の名称】　光走査装置

(57)【要約】
【課題】　被走査面上における走査線曲がりと走査線傾きとを補正し、光走査により形成される画像の品質を向上させる。
【解決手段】　レーザ光源１と、このレーザ光源１から出射された光束を主走査方向に偏向させる偏向器２と、この偏向器２により偏向された光束を収束させつつ被走査面１０上を等速度で走査させる走査光学系３と、被走査面１０と走査光学系３との間に設置されて光束を被走査面１０上に幾何光学的に収束させる補正光学系４とを備えた光走査装置において、走査光学系３と補正光学系４との間に第一反射ミラー５を配置し、この第一反射ミラー５を主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持する。



1

【特許請求の範囲】

【請求項1】　レーザ光源と、このレーザ光源から出射された光束を主走査方向に偏向させる偏向器と、この偏向器により偏向された光束を収束させつつ被走査面上を等速度で走査させる走査光学系と、前記被走査面と前記走査光学系との間に設置されて光束を被走査面上に幾何光学的に収束させる補正光学系とを備えた光走査装置において、

前記走査光学系と前記補正光学系との間に第一反射ミラーを配置し、この第一反射ミラーを主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持したことを特徴とする光走査装置。

【請求項2】　補正光学系と被走査面との間に第二反射ミラーを配置し、この第二反射ミラーを主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持したことを特徴とする請求項1記載の光走査装置。

【請求項3】　レーザ光源と、このレーザ光源から出射された光束を主走査方向に偏向させる偏向器と、この偏向器により偏向された光束を収束させつつ被走査面上を等速度で走査させる走査光学系と、前記被走査面と前記走査光学系との間に設置されて光束を被走査面上に幾何光学的に収束させる補正光学系とを備えた光走査装置において、

前記補正光学系を光軸方向と平行な回動中心の周りに回動自在及び任意位置固定自在に支持したことを特徴とする光走査装置。

【請求項4】　補正光学系の主走査方向の両端部にこの補正光学系の回動方向と平行な支持面を持つ支持部を設け、光軸方向と垂直であって前記支持面と面接触して前記支持部を摺動自在に支持する基準面をハウジング部に設けたことを特徴とする請求項3記載の光走査装置。

【請求項5】　補正光学系にこの補正光学系の主走査方向を位置決めする位置決め手段を設け、前記位置決め手段と係合する係合部をハウジング部に設けたことを特徴とする請求項3記載の光走査装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、レーザプリンタやデジタル複写機などで用いられる光走査装置に関する。

【0002】

【従来の技術】従来、レーザ光源から出射された光束を偏向器で偏向させ、被走査面を走査させる光走査装置としては様々な構造のものがある。その一例として特開平9-133888号公報に記載された光走査装置があり、半導体レーザとこの半導体レーザの発散光を平行光に変換するコリメータレンズとからなるレーザ光源、レーザ光源から出射された光束を主走査方向に偏向させる偏向器、偏向された光束を収束させつつ被走査面上を等速度で走査させる走査光学系、走査光学系と被走査面との間に設けられて偏向器の面倒れの影響を補正する補正

2

光学系等により構成されている。

【0003】

【発明が解決しようとする課題】しかし、補正光学系を設置する際の偏心により、補正光学系を通過する光束がこの補正光学系の主走査方向に沿った中心線位置から偏心すると、結像位置が直線上とならず湾曲するという走査線曲がりが発生する。

【0004】また、上記構造の光走査装置では、補正光学系やその他の光学素子の配置誤差により、補正光学系を通過する光束がこの補正光学系の主走査方向に沿った中心線に対して傾くと、被走査面上の走査線が傾くという走査線傾きが発生する。

【0005】そして、上述した走査線曲がりや走査線傾きが発生すると、複数の光走査装置を配列してカラー画像を形成する場合においては、色ズレの原因となる。

【0006】そこで本発明は、走査線曲がりと走査線傾きとを補正することができる光走査装置を提供することを目的とする。

【0007】

【課題を解決するための手段】請求項1記載の発明は、レーザ光源と、このレーザ光源から出射された光束を主走査方向に偏向させる偏向器と、この偏向器により偏向された光束を収束させつつ被走査面上を等速度で走査させる走査光学系と、前記被走査面と前記走査光学系との間に設置されて光束を被走査面上に幾何光学的に収束させる補正光学系とを備えた光走査装置において、前記走査光学系と前記補正光学系との間に第一反射ミラーを配置し、この第一反射ミラーを主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持した。従って、補正光学系を設置する際の偏心により、補正光学系を通過する光束がこの補正光学系の主走査方向に沿った中心線位置から偏心して走査線曲がりが発生した場合には、第一反射ミラーを回動中心の周りに回動させ、光束が補正光学系の主走査方向に沿った中心線位置を通過するように調節し、これにより、走査線曲がりを補正する。

【0008】請求項2記載の発明は、請求項1記載の発明の光走査装置において、補正光学系と被走査面との間に第二反射ミラーを配置し、この第二反射ミラーを主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持した。従って、第一反射ミラーを回動させて走査線曲がりを補正したときに、被走査面上の走査線の位置が副走査方向にズレた場合には、第二反射ミラーを回動中心の周りに回動させることによりそのズレを補正する。

【0009】請求項3記載の発明は、レーザ光源と、このレーザ光源から出射された光束を主走査方向に偏向させる偏向器と、この偏向器により偏向された光束を収束させつつ被走査面上を等速度で走査させる走査光学系と、前記被走査面と前記走査光学系との間に設置されて

光束を被走査面上に幾何光学的に収束させる補正光学系とを備えた光走査装置において、前記補正光学系を光軸方向と平行な回動中心の周りに回動自在及び任意位置固定自在に支持した。従って、補正光学系やその他の光学素子の配置誤差により、補正光学系を通過する光束がこの補正光学系の主走査方向に沿った中心線に対して傾いて走査線傾きが発生した場合には、補正光学系を回動中心の周りに回動させ、光束が補正光学系の主走査方向に沿った位置を通過するように調節し、これにより、走査線傾きを補正する。

【００１０】請求項４記載の発明は、請求項３記載の発明の光走査装置において、補正光学系の主走査方向の両端部にこの補正光学系の回動方向と平行な支持面を持つ支持部を設け、光軸方向と垂直であって前記支持面と面接触して前記支持部を摺動自在に支持する基準面をハウジング部に設けた。従って、補正光学系を回動させて走査線傾きを補正したときに、補正光学系が光軸方向に移動することが防止される。

【００１１】請求項５記載の発明は、請求項３記載の発明の光走査装置において、補正光学系にこの補正光学系の主走査方向を位置決めする位置決め手段を設け、前記位置決め手段と係合する係合部をハウジング部に設けた。従って、補正光学系を回動させて走査線傾きを補正したときに、補正光学系が主走査方向に移動することが防止される。

【００１２】

【発明の実施の形態】本発明の第一の実施の形態を図１ないし図１３に基づいて説明する。図１は、光走査装置の概略構造を示す斜視図である。この光走査装置は、レーザ光源１、偏向器であるポリゴンミラー２、複数枚のレンズからなる走査光学系３、補正光学系４、第一反射ミラー５を備えている。

【００１３】前記レーザ光源１は、半導体レーザ６とコリメータレンズ７とからなり、半導体レーザ６から出射された発散性光束であるレーザ光が、コリメータレンズ７を通過することにより平行光束となる。さらに、コリメータレンズ７を通過したレーザ光は、アパーチャ８を介してシリンダレンズ９に入射される。このシリンダレンズ９は、前記レーザ光源１からの平行光束を主走査方向に長い線像として結像させるものであり、このシリンダレンズ９の結像位置近傍に複数の偏向反射面２ａを有して回転駆動される前記ポリゴンミラー２が配置されている。ポリゴンミラー２へ入射された光束は、ポリゴンミラー２の高速回転に伴い主走査方向に偏向される。このポリゴンミラー２と被走査面である感光体１０との間に、前記走査光学系３と第一反射ミラー５と補正光学系４とが配置されている。

【００１４】前記走査光学系３は複数枚のレンズからなり、ポリゴンミラー２で偏向された光束を収束させつつ感光体１０上を等速的に走査させる。前記補正光学系４は、感光体１０上に結像される像の副走査方向の像面湾曲を補正する。また、補正光学系４は、この補正光学系４を通過する光束の進行方向（光軸方向）と平行な回動中心の周りに回動自在及び任意位置固定自在に支持され、回動中心の周りに回動することにより走査線傾きを補正する。前記第一反射ミラー５は、前記走査光学系３と前記補正光学系４との間に配置され、ポリゴンミラー２で偏向された光束の主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持され、回動中心の周りに回動することにより走査線曲がりを補正する。

【００１５】ここで、第一反射ミラー５を回動中心の周りに回動操作して走査線曲がりを補正する原理を、図２ないし図４に基づいて説明する。なお、座標系を、光束が進む進方向をＸ、主走査方向をＹ、副走査方向をＺと定め、それぞの回動方向をγ、β、αとする。

【００１６】図２において、第一反射ミラー５をβ方向に回動させると、感光体１０上の走査線は、副走査方向（Ｚ方向）にＡ，Ｂ，Ｃのように移動する。走査線Ｂは、補正光学系４を通過する光束がこの補正光学系４の主走査方向に沿った中心線位置を通過した場合の走査線である。走査線Ａ，Ｃは、補正光学系４を通過する光束がこの補正光学系４の主走査方向に沿った中心線位置から偏心した場合の走査線である。

【００１７】補正光学系４を通過する光束がこの補正光学系４の主走査方向に沿った中心線位置から偏心した場合には、補正光学系４の特性により感光体１０上の走査線は、図４に示すように湾曲する。走査線の主走査方向における両端を結んだ直線と主走査方向の中心部とのズレを走査線曲がり量として定義すると、走査線Ｃの走査線曲がり量ｄｗと、走査線Ａの走査線曲がり量ｄｗ′とは、方向が逆向きの量となる。また、走査線曲がり量は、走査線Ｂから離れるにつれて大きくなる。即ち、走査線曲がりは、第一反射ミラー５をβ方向に回動させることにより、その湾曲する方向と大きさとを自在に変化させることが可能である。

【００１８】つぎに、補正光学系４を回動中心の周りに回動操作して走査線傾きを補正する原理を、図５及び図６に基づいて説明する。

【００１９】図５において、補正光学系４の主走査方向に沿った一端側Ｐを支点として他端側Ｑをγ方向に回動させると、感光体１０上の走査線は、補正光学系４の特性によりγ方向にイ，ロ，ハの方向へ回動する。走査線ロは、補正光学系４を通過する光束がこの補正光学系４の主走査方向に沿った中心線位置を通過した場合の走査線である。走査線イ，ハは、補正光学系４を通過する光束がこの補正光学系４の主走査方向に沿った中心線に対して傾いた場合の走査線である。

【００２０】図６は、補正光学系４を通過する光束がこの補正光学系４の主走査方向に沿った中心線に対して傾

5

いた場合の走査線の傾き状態を示す。走査線イ，ハは、傾きの方向が反対である。また、走査線の傾きｄｋは、走査線ロから離れるにつれて大きくなる。即ち、走査線の傾きは、補正光学系４をγ方向に回動させることにより、その傾きの方向と大きさとを自在に変化させることができる。

【００２１】つぎに、第一反射ミラー５を主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持する構造を図７及び図８に基づいて説明する。図７は、第一反射ミラー５の取付構造を示す分解斜視図である。第一反射ミラー５を含む光走査装置が設置されるハウジング部１１（図１１参照）には、第一反射ミラー５の主走査方向の両端部を支持する一対の取付部１２，１３が固定されている。一方の取付部１２には、三角柱形の突起１２ａと、ネジ穴１２ｂと、ネジ穴１２ｃとが形成されている。ネジ穴１２ｂには、板バネ１４を取り付ける取付ネジ１５が螺合されている。ネジ穴１２ｃには、第一反射ミラー５を回動調節する調節ネジ１６が螺合されている。この調節ネジ１６は矢印R方向に回動自在であり、調節ネジ１６を矢印R方向に回動操作することによりこの調節ネジ１６は矢印S方向へ進退する。他方の取付部１３には、三角柱形の突起１３ａと、ネジ穴１３ｂとが形成されている。ネジ穴１３ｂには、板バネ１７を取り付ける取付ネジ１８が螺合されている。

【００２２】図８は、第一反射ミラー５を主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持した状態である。第一反射ミラー５の反射面には、突起１２ａ，１３ａの先端部と調節ネジ１６の先端部との３点が当接されている。そして、第一反射ミラー５の反射面は、板バネ１４，１７の付勢力によって突起１２ａ，１３ａの先端部と調節ネジ１６の先端部との３点に押し付けられている。

【００２３】つぎに、補正光学系４の詳細な構造を図９に示し、この補正光学系４を光軸方向と平行な回動中心の周りに回動自在及び任意位置固定自在に支持する構造を図１０ないし図１３に基づいて説明する。

【００２４】図９に示すように、補正光学系４は、レンズ部４ａとこのレンズ部４ａを囲むように配されているリブ部４ｂとを樹脂により一体成形した構造になっている。補正光学系４の主走査方向の両端部には、この補正光学系４を回動中心の周りに回動させる回動方向と平行な支持面４ｃ，４ｄを持つ支持部４ｅ，４ｆが形成されている。さらに、補正光学系４のリブ部４ｂにおける主走査方向に沿った中央部には、この補正光学系４の主走査方向を位置決めする位置決め手段である位置決め突起４ｇが光軸方向に突出して形成されている。位置決め突起４ａの光軸方向と直交する向きの断面は、円形又は長方形の角を丸めた形状に形成されている。

【００２５】図１０は、補正光学系４の取付構造を示す分解斜視図である。補正光学系４を含む光走査装置が設

6

置される前記ハウジング部１１には、補正光学系４の主走査方向の両端部を支持する一対の取付部１９，２０が固定されている。これらの取付部１９，２０には、光軸方向と垂直であって前記支持面４ｃ，４ｄと面接触して前記支持部４ｅ，４ｆを摺動自在に支持する基準面１９ａ，２０ａが形成されている。

【００２６】前記ハウジング部１１には、前記取付部１９，２０に近接した位置に固定部２１，２２が固定されている。一方の固定部２１には、光軸方向に延出した半円筒部２３が形成されている。他方の固定部２２には、補正光学系４を回動調節する調節ネジ２４が取り付けられている。この調節ネジ２４は、矢印J方向に回動自在であり、調節ネジ２４を矢印J方向に回動操作することによりこの調節ネジ２４は矢印K方向へ進退する。

【００２７】また、前記ハウジング部１１には、前記取付部１９，２０に近接した位置において取付ネジ２５により一対の板バネ２６が取り付けられている。これらの板バネ２６は長短一対のバネ部２６ａ，２６ｂを有する。

【００２８】さらに、前記ハウジング部１１には、前記位置決め突起４ｇが係合する係合部である係合溝２７が形成されている。

【００２９】図１１は、補正光学系４を光軸方向と平行な回動中心の周りに回動自在及び任意位置固定自在に支持した状態の側面図、図１２はその平面図、図１３はその一部を示す正面図である。補正光学系４の支持面４ｃ，４ｄと取付部１９，２０の基準面１９ａ，２０ａとが面接触されている。補正光学系４の一端側のリブ部４ｂの側面に半円筒部２３が当接され、他端側のリブ部４ｂの側面に調節ネジ２４の先端部が当接されている。また、板バネ２６の長尺のバネ部２６ａが支持部４ｅ，４ｆの上面部に当接され、板バネ２６の短尺のバネ部２６ｂがリブ部４ｂの側面に当接されている。さらに、位置決め突起４ｇが係合溝２７に係合されている。

【００３０】このような構成において、第一反射ミラー５を図８に示すように支持した後に、調整ネジ１６を矢印R方向へ回動操作する。すると、調整ネジ１６が矢印S方向へ進退し、第一反射ミラー５が矢印β方向へ回動する。そして、第一反射ミラー５が矢印β方向へ回動することにより、図２ないし図４で説明したように、走査光学系３を通過する光束をこの補正光学系４の主走査方向に沿った中心線位置を通過させることができる。従って、補正光学系４を設置する際の偏心により、補正光学系４を通過する光束がこの補正光学系４の主走査方向に沿った中心線位置から偏心しても、第一反射ミラー５を回動操作することにより、この補正光学系４を通過する光束を補正光学系４の主走査方向に沿った中心線位置を通過させることができ、これにより、感光体１０上での走査線曲がりの発生を防止することができる。

【００３１】このため、複数の光走査装置を配列してカ

ラー画像を形成する場合においては、走査線曲がりが原因となる色ズレの発生を防止することができる。

【００３２】つぎに、補正光学系４を図１１及び図１２に示すように支持した後に、調整ネジ２４を矢印Ｊ方向へ回動する。すると、調整ネジ２４が矢印Ｋ方向へ進退し、補正光学系４の一端側が矢印γ方向へ回動する。そして、補正光学系４が矢印γ方向へ回動することにより、図５及び図６で説明したように、補正光学系４を通過する光束をこの補正光学系４の主走査方向に沿った中心線に沿って通過させることができる。従って、補正光学系４やその他の光学素子の配置誤差により、補正光学系４を通過する光束が、この補正光学系４の主走査方向に沿った中心線に対して傾いても、補正光学系４を回動操作することにより、この補正光学系４を通過する光束を補正光学系４の主走査方向に沿った中心線に沿って通過させることができ、これにより、感光体１０上での走査線傾きを補正することができる。

【００３３】このため、複数の光走査装置を配列してカラー画像を形成する場合においては、走査線傾きが原因となる色ズレの発生を防止することができる。

【００３４】また、補正光学系４を矢印γ方向に回動させたとき、支持面４ｃ，４ｄと基準面１９ａ，２０ａとが面接触して摺動するため、この回動に伴って補正光学系４が光軸方向に移動することが防止される。このため、補正光学系４を回動させて走査線傾きを補正した場合でも、感光体１０上における光束のスポット径が一定となり、画像品質が安定する。

【００３５】さらに、補正光学系４を矢印γ方向に回動させたとき、位置決め突起４ｇが係合溝２７に係合しているため、この回動に伴って補正光学系４が主走査方向に移動することが防止される。このため、補正光学系４を回動させて走査線傾きを補正した場合でも、走査線の主走査方向に沿った位置ズレの発生が防止され、画像品質が安定する。

【００３６】つぎに、本発明の第二の実施の形態を図１４に基づいて説明する。なお、図１ないし図１３において説明した部分と同じ部分は同じ符号で示し、説明も省略する。本実施の形態の光走査装置は、第一の実施の形態の光走査装置に対して、補正光学系４と感光体１０との間に第二反射ミラー２８を配置し、この第二反射ミラー２８を主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持したものである。この支持構造としては、図７及び図８に示した構造と同じである。

【００３７】このような構成において、第一反射ミラー５を回動させて走査線曲がりを補正したときに、感光体１０上の走査線の位置が副走査方向にズレる場合がある。このような場合に、第二反射ミラー２８を回動操作することによりそのズレを補正することができる。

【００３８】このため、複数の光走査装置を配列してカラー画像を形成する場合においては、各色に関して副走査方向に色ズレすることを防止できる。

【００３９】

【発明の効果】請求項１記載の発明の光走査装置によれば、走査光学系と補正光学系との間に第一反射ミラーを配置し、この第一反射ミラーを主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持したので、補正光学系を設置する際の偏心により、補正光学系を通過する光束がこの補正光学系の主走査方向に沿った中心線位置から偏心して走査線曲がりが発生した場合には、第一反射ミラーを主走査方向に沿った回動中心の周りに回動させることにより、補正光学系を通過する光束が補正光学系の主走査方向に沿った中心線位置を通過するように調節することができ、これにより、走査線曲がりを補正することができ、光走査により形成する画像の品質を向上させることができる。

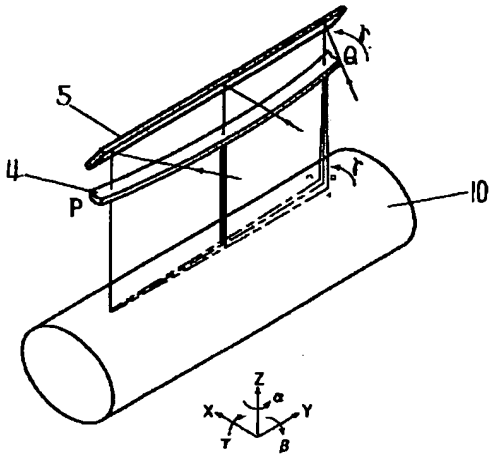
【００４０】請求項２記載の発明の光走査装置によれば、請求項１記載の発明の光走査装置において、補正光学系と被走査面との間に第二反射ミラーを配置し、この第二反射ミラーを主走査方向に沿った回動中心の周りに回動自在及び任意位置固定自在に支持したので、第一反射ミラーを回動させて走査線曲がりを補正したときに、被走査面上の走査線の位置が副走査方向にズレた場合には、第二反射ミラーを回動中心の周りに回動させることによりそのズレを補正することができ、これにより光走査により形成する画像の品質を向上させることができ、特に、カラー画像を形成する場合において各色が副走査方向に色ズレすることを防止できる。

【００４１】請求項３記載の発明の光走査装置によれば、補正光学系を光軸方向と平行な回動中心の周りに回動自在及び任意位置固定自在に支持したので、補正光学系やその他の光学素子の配置誤差により、補正光学系を通過する光束がこの補正光学系の主走査方向に沿った中心線に対して傾いて走査線傾きが発生した場合には、補正光学系を回動中心の周りに回動させることにより補正光学系を通過する光束が補正光学系の主走査方向に沿った位置を通過するように調節することができ、これにより、走査線傾きを補正することができ、光走査により形成する画像の品質を向上させることができる。

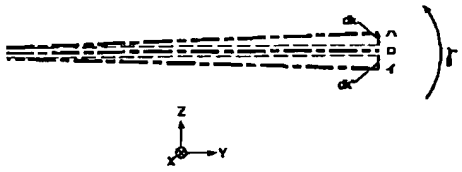
【００４２】請求項４記載の発明の光走査装置によれば、請求項３記載の発明の光走査装置において、補正光学系の主走査方向の両端部にこの補正光学系の回動方向と平行な支持面を持つ支持部を設け、光軸方向と垂直であって前記支持面と面接触して前記支持部を摺動自在に支持する基準面をハウジング部に設けたので、補正光学系を回動させて走査線傾きを補正したときに、補正光学系が光軸方向に移動することを防止でき、被走査面上における光束のスポット径を一定にしてこの光走査で形成する画像の品質を向上させることができる。

【００４３】請求項５記載の発明の光走査装置によれ

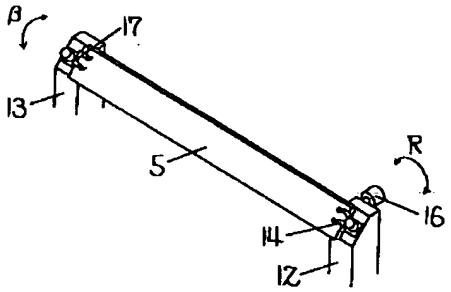
【図5】



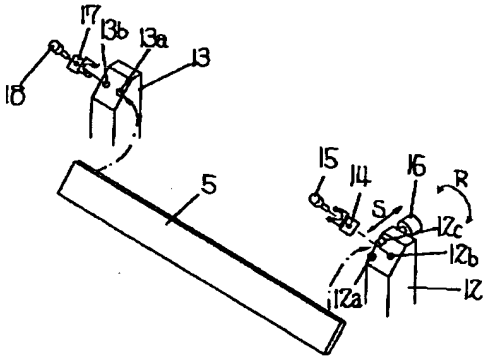
【図6】



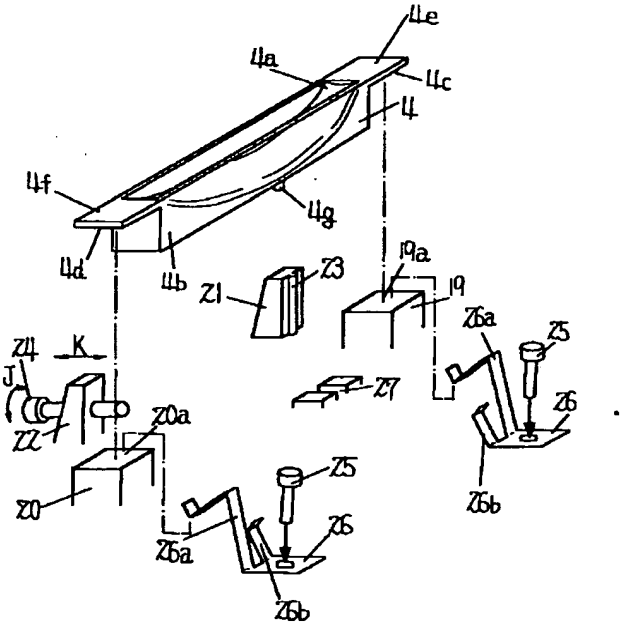
【図8】



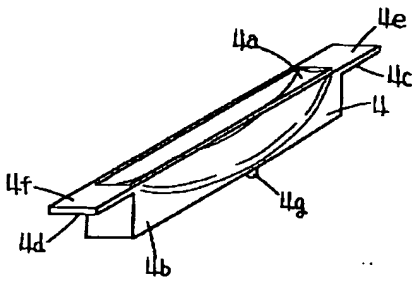
【図7】



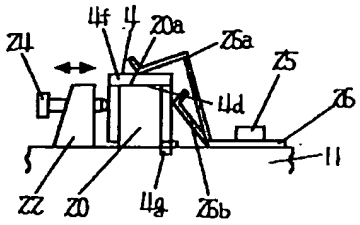
【図10】



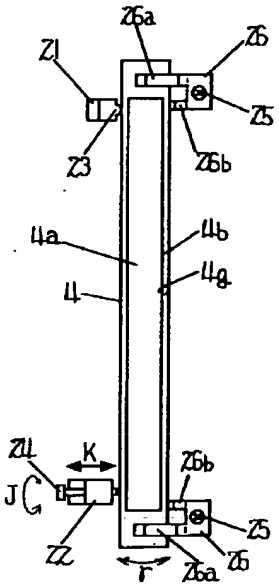
【図9】



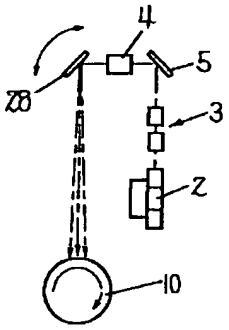
【図11】


4f
4
20a
26a
25
4d
26
24
11
22
20
4g
26b

【図12】


26a
26
21
25
23
26b
4a
4b
4
4g
24
K
J
26b
25
22
26
26a
r

【図14】


4
5
28
3
2
10

ば、請求項3記載の発明の光走査装置において、補正光学系にこの補正光学系の主走査方向を位置決めする位置決め手段を設け、前記位置決め手段と係合する係合部をハウジング部に設けたので、補正光学系を回動させて走査線傾きを補正したときに、補正光学系が主走査方向に移動することを防止でき、走査線の主走査方向に沿った位置ズレの発生を防止してこの光走査で形成する画像の品質を向上させることができる。

【図面の簡単な説明】

【図1】本発明の第一の実施の形態における光走査装置の概略構造を示す斜視図である。

【図2】走査線曲がりを補正する原理を説明する斜視図である。

【図3】走査線曲がりを補正する原理を説明する側面図である。

【図4】走査線曲がりを補正する原理を説明する平面図である。

【図5】走査線傾きを補正する原理を説明する斜視図である。

【図6】走査線傾きを補正する原理を説明する平面図である。

【図7】第一反射ミラーの取付構造を示す分解斜視図である。

【図8】第一反射ミラーの取付状態を示す斜視図である。

【図9】補正光学系の構造を示す斜視図である。

【図10】補正光学系の取付構造を示す分解斜視図である。

【図11】補正光学系の取付状態を示す側面図である。

【図12】補正光学系の取付状態を示す平面図である。

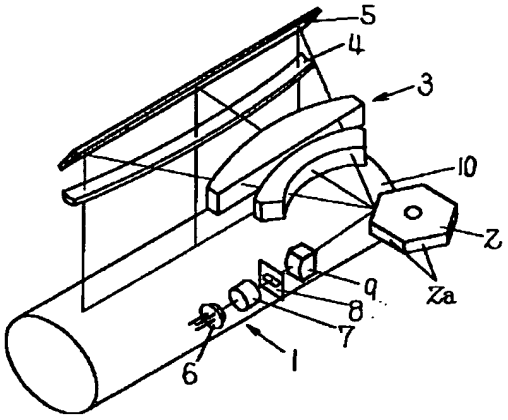
【図13】補正光学系の取付時における位置決め突起と係合溝との係合状態を示す正面図である。

【図14】本発明の第二の実施の形態における光走査装置の概略構造を示す模式図である。

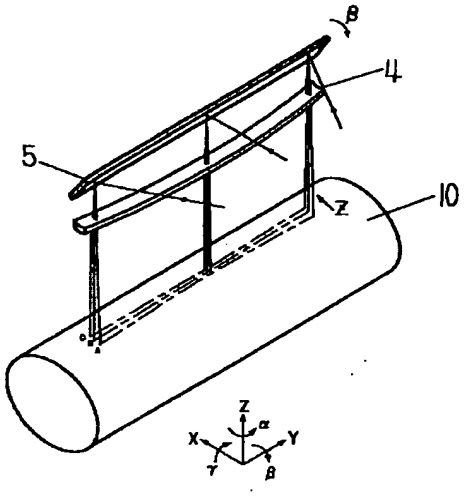
【符号の説明】

1　　レーザ光源
2　　偏向器
3　　走査光学系
4　　補正光学系
4c，4d　支持面
4e，4f　支持部
4g　位置決め手段
5　　第一反射ミラー
10　　被走査面
11　　ハウジング部
19a，20a　基準面
27　　係合部
28　　第二反射ミラー

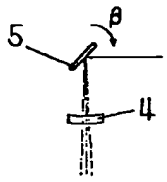
【図1】



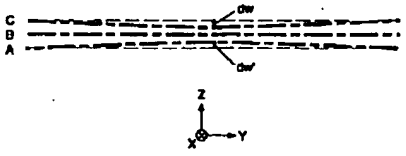
【図2】



【図3】



【図4】



【図13】